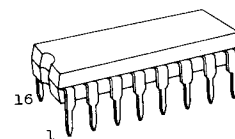


TC4527BP BCD RATE MULTIPLIER

TC4527BP is BCD rate multiplier from which arbitrary number of output pulses determined by BCD inputs (A_{IN} through D_{IN}) can be obtained by supplying ten clock inputs.

For example, setting BCD input to "7" (A = B = C = "H" and D = "L"), if ten counting pulses are applied to CLOCK input, seven pulses are output to OUT (OUT) terminals. Usually, when used alone, ENABLE, STROBE AND CASCADE inputs are kept at "L" level but when used in the cascade connection, refer to the example of applications.

Besides of its original purpose of arithmetic circuits, this TC4527BP can be utilized for digital filters, frequency synthesizers and programmable pulse generators.

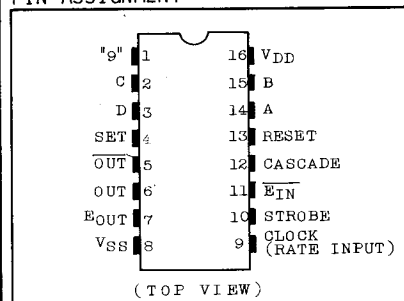


DIP16(3D16A-P)

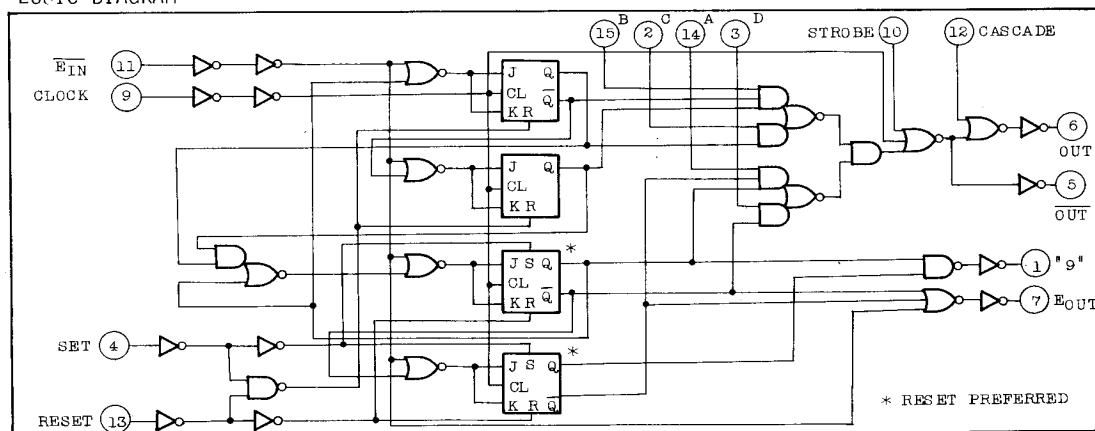
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V _{DD}	V _{SS} - 0.5 ~ V _{SS} + 20	V
Input Voltage	V _{IN}	V _{SS} - 0.5 ~ V _{DD} + 0.5	V
Output Voltage	V _{OUT}	V _{SS} - 0.5 ~ V _{DD} + 0.5	V
DC Input Current	I _{IN}	±10	mA
Power Dissipation	P _D	300	mW
Operating Temperature Range	T _A	-40 ~ 85	°C
Storage Temperature Range	T _{stg}	-65 ~ 150	°C
Lead Temp./Time	T _{sol}	260°C • 10 sec	

PIN ASSIGNMENT



LOGIC DIAGRAM

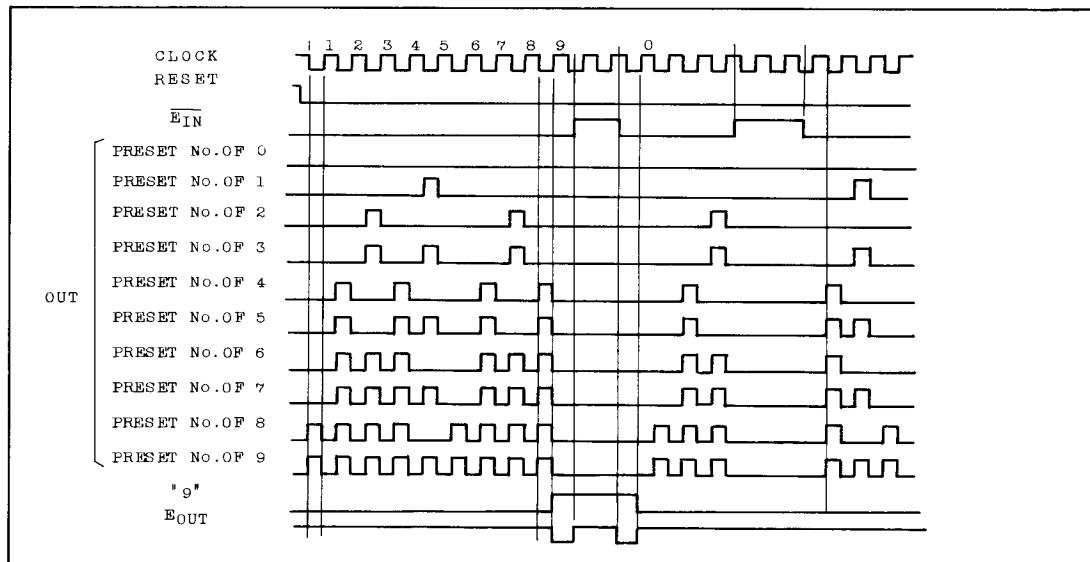


TRUTH TABLE

INPUTS										OUTPUTS			
D	C	B	A	No. OF CLOCK PULSES	$\overline{E_{IN}}$	STROBE	CASCADE	RESET	SET	OUT	$\overline{OUT}$	"9"	E_{OUT}
L	L	L	L	10	L	L	L	L	L	L	H	1	1
L	L	L	H	10	L	L	L	L	L	1	1	1	1
L	L	H	L	10	L	L	L	L	L	2	2	1	1
L	L	H	H	10	L	L	L	L	L	3	3	1	1
L	H	L	L	10	L	L	L	L	L	4	4	1	1
L	H	L	H	10	L	L	L	L	L	5	5	1	1
L	H	H	L	10	L	L	L	L	L	6	6	1	1
L	H	H	H	10	L	L	L	L	L	7	7	1	1
H	L	L	L	10	L	L	L	L	L	8	8	1	1
H	L	L	H	10	L	L	L	L	L	9	9	1	1
H	L	H	L	10	L	L	L	L	L	8	8	1	1
H	L	H	H	10	L	L	L	L	L	9	9	1	1
H	H	L	L	10	L	L	L	L	L	8	8	1	1
H	H	L	H	10	L	L	L	L	L	9	9	1	1
H	H	H	L	10	L	L	L	L	L	8	8	1	1
H	H	H	H	10	L	L	L	L	L	9	9	1	1
*	*	*	*	10	H	L	L	L	L	▲	▲	▲	H
*	*	*	*	10	L	H	L	L	L	L	H	1	1
*	*	*	*	10	L	L	H	L	L	H	▲	1	1
H	*	*	*	10	L	L	L	H	L	10	10	L	H
L	*	*	*	10	L	L	L	H	L	L	H	L	H
*	*	*	*	10	L	L	L	L	H	L	H	H	L

* DON'T CARE ▲ UNDETERMINED 1~10 : NO OF PULSES

TIMING CHART



RECOMMENDED OPERATING CONDITIONS ($V_{SS}=0V$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS
DC Supply Voltage	V_{DD}	3	-	18	V
Input Voltage	V_{IN}	0	-	V_{DD}	V

STATIC ELECTRICAL CHARACTERISTICS ($V_{SS}=0V$)

CHARACTERISTIC		SYMBOL	TEST CONDITIONS	V _{DD} (V)	-40°C		25°C			85°C		UNITS
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage		V _{OH}	I _{OUT} < 1μA V _{IN} =V _{SS} , V _{DD}	5	4.95	—	4.95	5.00	—	4.95	—	V
				10	9.95	—	9.95	10.00	—	9.95	—	
				15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage		V _{OL}	I _{OUT} < 1μA V _{IN} =V _{SS} , V _{DD}	5	—	0.05	—	0.00	0.05	—	0.05	V
				10	—	0.05	—	0.00	0.05	—	0.05	
				15	—	0.05	—	0.00	0.05	—	0.05	
Output High Current		I _{OH}	V _{OH} =4.6V	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
			V _{OH} =2.5V	5	-2.5	—	-2.1	-4.0	—	-1.7	—	
			V _{OH} =9.5V	10	-1.5	—	-1.3	-2.2	—	-1.1	—	
			V _{OH} =13.5V	15	-4.0	—	-3.4	-9.0	—	-2.8	—	
			V _{IN} =V _{SS} , V _{DD}									
Output Low Current		I _{OL}	V _{OL} =0.4V	5	0.61	—	0.51	1.5	—	0.42	—	mA
			V _{OL} =0.5V	10	1.5	—	1.3	3.8	—	1.1	—	
			V _{OL} =1.5V	15	4.0	—	3.4	15.0	—	2.8	—	
			V _{IN} =V _{SS} , V _{DD}									
Input High Voltage		V _{IH}	V _{OUT} =0.5V, 4.5V	5	3.5	—	3.5	2.75	—	3.5	—	V
			V _{OUT} =1.0V, 9.0V	10	7.0	—	7.0	5.5	—	7.0	—	
			V _{OUT} =1.5V, 13.5V	15	11.0	—	11.0	8.25	—	11.0	—	
			I _{OUT} < 1μA									
Input Low Voltage		V _{IL}	V _{OUT} =0.5V, 4.5V	5	—	1.5	—	2.25	1.5	—	1.5	V
			V _{OUT} =1.0V, 9.0V	10	—	3.0	—	4.5	3.0	—	3.0	
			V _{OUT} =1.5V, 13.5V	15	—	4.0	—	6.75	4.0	—	4.0	
			I _{OUT} < 1μA									
Input Current	"H" Level	I _{IH}	V _{IH} =18V	18	—	0.1	—	10 ⁻⁵	0.1	—	1.0	μA
	"L" Level	I _{IL}	V _{IL} =0V	18	—	-0.1	—	-10 ⁻⁵	-0.1	—	-1.0	
Quiescent Device Current		I _{DD}	V _{IN} =V _{SS} , V _{DD} *	5	—	5	—	0.005	5	—	150	μA
				10	—	10	—	0.010	10	—	300	
				15	—	20	—	0.015	20	—	600	

* All valid input combinations.

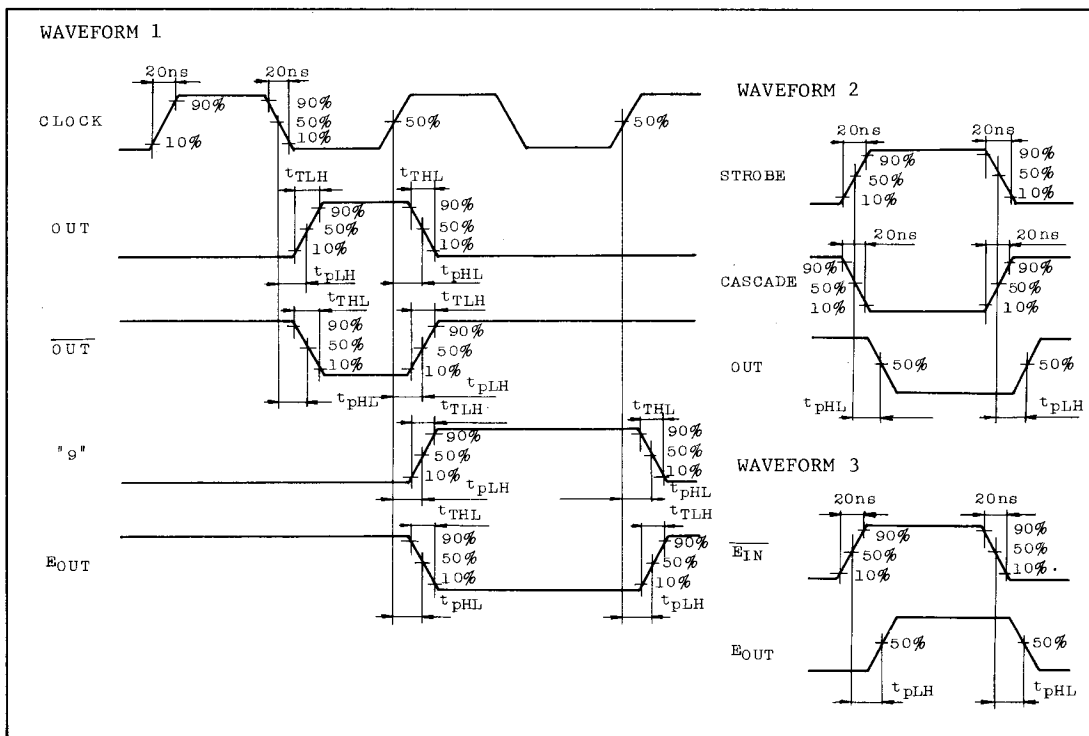
DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNITS
Output Transition Time (Low to High)	t_{TLH}		5	-	80	200	ns
			10	-	50	100	
			15	-	40	80	
Output Transition Time (High to Low)	t_{THL}		5	-	80	200	
			10	-	50	100	
			15	-	40	80	
Propagation Delay Time (CLOCK - OUT)	t_{pLH} t_{pHL}		5	-	230	460	
			10	-	95	190	
			15	-	70	140	
Propagation Delay Time (CLOCK - $\overline{OUT}$)	t_{pLH} t_{pHL}		5	-	190	380	
			10	-	80	160	
			15	-	60	120	
Propagation Delay Time (CLOCK - E_{OUT})	t_{pLH} t_{pHL}		5	-	340	680	
			10	-	140	280	
			15	-	100	200	
Propagation Delay Time (CLOCK - "9")	t_{pLH} t_{pHL}		5	-	260	600	
			10	-	150	300	
			15	-	100	200	
Propagation Delay Time (STROBE - OUT)	t_{pLH} t_{pHL}		5	-	150	300	
			10	-	65	150	
			15	-	55	120	
Propagation Delay Time (CASCADE - OUT)	t_{pLH} t_{pHL}		5	-	95	190	
			10	-	45	90	
			15	-	30	70	
Propagation Delay Time (SET, RESET - OUT)	t_{pLH} t_{pHL}		5	-	320	660	
			10	-	130	300	
			15	-	100	220	
Propagation Delay Time ($\overline{E_{IN}}$ - E_{OUT})	t_{pLH} t_{pHL}		5	-	140	280	
			10	-	60	120	
			15	-	50	100	
Max. Clock Frequency	f_{CL}		5	1.0	2	-	MHz
			10	2.5	6	-	
			15	3.5	8	-	
Max. Clock Input Rise Time Max. Clock Input Fall Time	t_{rCL} t_{fCL}		5	20	-	-	μs
			10	15	-	-	
			15	15	-	-	
Min. Clock Pulse Width	t_w		5	-	250	500	ns
			10	-	85	170	
			15	-	60	100	
Min. Pulse Width (SET, RESET)	t_{WH}		5	-	110	220	
			10	-	45	90	
			15	-	35	70	

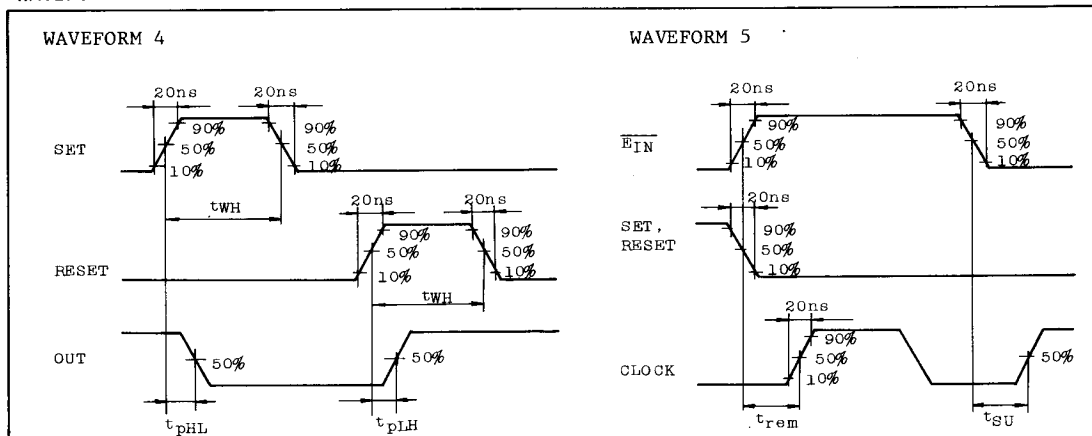
DYNAMIC ELECTRICAL CHARACTERISTICS (Continued)

CHARACTERISTIC	SYMBOL	TEST CONDITION	$V_{CC}(V)$	MIN.	TYP.	MAX.	UNITS
Min. Set-up Time ($\overline{E_{IN}}$ - CLOCK)	t_{SU}		5 10 15	- - -	160 60 50	320 120 100	ns
Min. Removal Time ($\overline{E_{IN}}$ - CLOCK)	t_{rem}		5 10 15	- - -	120 45 25	240 130 110	
Min. Removal Time (SET - CLOCK)	t_{rem}		5 10 15	- - -	-50 -20 -10	0 0 0	
Min. Removal Time (RESET - CLOCK)	t_{rem}		5 10 15	- - -	-35 -15 -10	60 40 30	
Input Capacitance	C_{IN}			-	5	7.5	pF

WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



APPLICATION CIRCUIT

